

THE CLAIMS

Having thus described the invention, what is CLAIMED is:

1. A folded-path radiation absorption gas cell comprising: an enclosure having first and second ends, and defining a substantially closed chamber therewithin; spaced input radiation and output radiation windows formed through said first end of said enclosure and aligned on a first axis; a concave reflective field surface extending at least partially between said windows at said first end of said enclosure; a pair of substantially spherical, concave reflective objective surfaces at said second end of said enclosure disposed in confronting relationship to said field surface, said objective surfaces being aligned side-by-side on an axis parallel to said first axis and in optical registry with said windows, at least one of said objective surfaces having a cylindrical component added thereto to increase coincidence of focii in two orthogonal planes, thereby to maximize the energy throughput characteristic of said cell; and means for the introduction and withdrawal of gas into and from said chamber of said enclosure.

2. The gas cell of Claim 1 wherein said cylindrical component extends parallel to said first and second axes, and wherein centers of curvature of said objective surfaces are located behind said field surface.

3. The gas cell of Claim 2 wherein both of said objective surfaces are formed with said added cylindrical component.

4. The gas cell of Claim 1 wherein said reflective field surface is elliptical, the major axis of said elliptical surface being parallel to said first and second axes.

5. The gas cell of Claim 1 wherein at least said ends of said cell are provided by metal components, and wherein said reflective surfaces comprise machined surfaces of said components.

6. The gas cell of Claim 5 wherein said enclosure is fabricated substantially entirely of a single metal composition having high thermal conductivity, and wherein the walls of said enclosure are relatively thick so as to afford to said cell optimal thermal-response characteristics.

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7. A folded-path radiation absorption gas cell comprising: an enclosure having first and second ends, and defining a substantially closed chamber therewithin; spaced input radiation and output radiation windows formed through said first end of said enclosure and aligned on a first axis; an elliptical concave reflective field surface extending at least partially between said windows at said first end of said enclosure; a pair of substantially spherical, concave reflective objective surfaces at said second end of said enclosure disposed in confronting relationship to said field surface, said objective surfaces being aligned side-by-side on an axis parallel to said first axis, in optical registry with said windows and with their centers of curvature located behind said field surface, at least one of said objective surfaces having a cylindrical component added thereto to increase coincidence of focii in two orthogonal planes, thereby maximizing the energy throughput characteristic of said cell; and means for the introduction and withdrawal of gas into and from said chamber of said enclosure.

8. The gas cell of Claim 7 wherein both of said objective surfaces are formed with said added cylindrical component, said component extending parallel to said first and second axes.

9. An analytical optical instrument comprising, in combination:

(a) a folded-path radiation absorption gas cell comprising: an enclosure having first and second ends, and defining a substantially closed chamber therewithin; spaced input radiation and output radiation windows formed through said first end of said enclosure and aligned on a first axis; a concave reflective field surface extending at least partially between said windows at said first end of said enclosure; a pair of substantially spherical, concave reflective objective surfaces at said second end of said enclosure disposed in confronting relationship to said field surface, said objective surfaces being aligned side-by-side on an axis parallel to said first axis and in optical registry with said windows, at least one of said objective surfaces having a cylindrical component added thereto to increase coincidence of focii in two orthogonal planes, thereby to maximize the energy throughput characteristic of said cell; and means for the introduction and withdrawal of gas into and from said chamber of said enclosure;

(b) a spectrometer including radiation source means, radiation-discriminating means, and a detector responsive to radiation from said source means; and

(c) transfer optics, said transfer optics being constructed and arranged to cause a radiation beam from said discriminating means to pass through said gas cell before impinging upon said detector.

10. The instrument of Claim 9 wherein both of said objective surfaces of said gas cell are formed with said added cylindrical component, said component extending parallel to said first and second axes; wherein centers of curvature of said 5 objective surfaces are located behind said field surface; and wherein said reflective field surface is elliptical, the major axis of said elliptical surface being parallel to said axes.

11. The instrument of Claim 9 wherein said radiation-discriminating means is an interferometer.